

Arctic Oil and Gas Resource Development: Current Situation and Prospects

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Arctic Oil and Gas Resource Development: Current Situation and Prospects

The decline in global oil prices that began in the summer of 2014 carries with it a number of risks in assembling a whole range of major oil and gas projects, including shale gas extraction projects, deep-water offshore projects and projects in the Arctic shelf.

In these conditions, despite the ongoing surplus of global oil production in relation to consumption, the question nevertheless arises: how can we maintain current production levels in the medium and long term and ensure growth in order to meet world demand?

According to the Organization of the Petroleum Exporting Countries (OPEC) and International Energy Agency (IEA) estimates, by 2040 energy demand will be 40–60 per cent greater than in 2010. Oil will continue to play a leading role in the global energy balance, accounting for 25–27 per cent of the total supply, with gas making up 24–26 per cent (compared to 35 per cent and 26 per cent, respectively, today).¹ A large proportion of oil and gas production by 2040 will take place at deposits that have not yet been explored.

Under these circumstances, taking the projected volume of the Arctic shelf's undiscovered oil and gas reserves into account, the estimated 90 billion barrels of oil and 47 trillion cubic metres of natural gas,² offshore oil and gas resources in the Arctic could, in the medium and long term, play significant role both in maintaining current oil and gas production levels and in ensuring growth in the future.

Greenland (Denmark)

Oil and gas resources have been developed on the continental shelf of Greenland since the 1970s. In 1976 and 1977, US and European companies drilled five exploratory wells that turned out to be “dry”. Interest in continuing exploration work also dried up as a result. A number of attempts to find commercial oil and gas reserves were made in the 1990s, but they were unsuccessful.³

In 2006–2007, the Government of Greenland issued eight licenses for the exploration of Baffin Bay to companies: Dong Energy (Denmark), Exxon (United States), Husky (Canada), PA Resources (Sweden) and Cairn Energy (United Kingdom). In 2010–2011 Cairn Energy (United Kingdom) drilled 8 exploration wells. The company discovered some oil resources but they were considered insufficient for development. Cairn Energy spent \$1.2 billion on exploration.⁴

In 2012, a consortium of oil and gas companies, including Conoco Phillips (United States), GDF Suez (France), Nunaoil (Greenland), Maersk (Denmark), Statoil (Norway), Cairn Energy и Shell (Netherlands, as main operator) drilled 11 exploratory and prospecting wells in the shallow waters of Baffin Bay. Commercial oil and gas reserves were not found.⁵

The decline in oil prices had a negative impact on the plans of oil and gas companies to continue searching for oil in Greenland. A number of companies gave up exploration on the continental shelf of Greenland where according to Denmark and Greenland's Geological Service the cost of oil production is over \$50 per barrel.⁶

Even though oil and gas companies have lost their initial interest in the shelf of Greenland, Greenland's government plans to auction several licensed sites on the island's west coast in 2016—2018.⁷ In December 2016, it plans to auc-

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¹ World Oil Outlook 2014 // Organization of the Petroleum Exporting Countries.

URL: https://www.opec.org/opec_web/static_files_project/media/downloads/publications/WOO_2014.pdf

² Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of the Arctic Circle. US Geological Survey. Fact Sheet 2008-3049; Assessment of Undiscovered Oil and Gas in the Arctic. Science. 29 May 2009; Vol. 324 no. 5931, pp. 1175-1179.

³ Gregersen U. A Summary of the Oil & Gas Exploration History of Greenland // Greenland Oil Industry Administration. URL: <http://www.goia.gl/OilGasinGreenland/History.aspx>

⁴ Cairn Energy PLC. Arctic Exploration – Lessons from Cairn Energy's Drilling in Greenland. June 2012. P. 15.

⁵ Uulex: Greenland Oil Exploration Newsletter // Greenland Bureau of Minerals and Petroleum. Uulex. 4. November 2012. URL: http://www.govmin.gl/images/stories/petroleum/uulex/uulex_no4_november_2012.pdf

⁶ Oil Approaching \$35 Final Blow to Greenland's Exploration Dreams // Bloomberg. 14 December 2015.

URL: <https://www.bloomberg.com/news/articles/2015-12-14/oil-approaching-35-final-nail-in-greenland-s-exploration-dreams>

⁷ Kurth A., Thorup S. Oil and Gas in Greenland – Still on Ice? // Andrews Kurth. November 2014.

URL: http://www.andrewskurth.com/pressroom-publications-1165.html?utm_source=Mondaq&utm_medium=syndication&utm_campaign=View-Original

tion three sites on Disko Island in the Baffin Bay, and in 2017–2018, it plans to auction sites in the Baffin Bay itself.

At the same time, the government of Greenland does not expect any significant budget revenues from the oil and gas industry in the nearest 5–10 years.⁸

Norway

The falling production in major deposits in the North and Norwegian seas has led the Government of the Kingdom of Norway to step up its efforts to attract oil and gas companies to develop resources in the Barents Sea.

At present, only one deposit in the Norwegian continental shelf is in commercial operation – the Snøhvit (“Snow White”) natural gas field, which was opened back in 1984 and is located 150 kilometres from the Norwegian coast. The deposit has reserves of 193 billion cubic metres of gas and 113 million barrels of natural-gas condensate.⁹ Gas production at the site started in 2007. A full-scale manufacturing complex has been built in order to develop the field. It consists of 19 production wells, CO₂ injection wells, a 160-km subsea pipeline and the Hammerfest LNG plant, which produces 4.3 million tonnes of liquefied natural gas per year. The project is being operated by Statoil, which holds a 33.53 per cent stake.

The Goliat field discovered in 2000 is now in the final stages of commissioning, with reserves of 174 million barrels of oil and 8 billion cubic metres of natural gas. The Sevan FPSO 1000 floating platform was delivered to the oil field in spring 2015. It will double up as a storage facility for one million barrels of oil and a floating terminal for its shipment.¹⁰ In March 2016, two years behind schedule, the rig started industrial oil production, yet already in August it stopped, due to a blackout.¹¹ Eni, the project operator, estimates that it breaks even on its Goliat oil

field exploration with oil prices of about \$50 per barrel. Norwegian consulting company Rystad Energy, however, estimates that investments into the project can be recovered only with oil prices of \$100 per barrel.¹²

The Barents Sea has a number of other deposits with commercial oil reserves: the Johan Castberg, Gohta, Alta and Wisting Central fields. However, investment decisions with regard to developing these deposits have not yet been made. This is due in part to falling oil prices around the world and the subsequent need to review the financial, economic and technical parameters of projects. Russia’s Rosneft and LUKOIL are involved in several projects in the region.

In 2014, after the 22nd licensing round, Rosneft acquired a 20% stake in the license PL713 on the Norwegian shelf in the Barents Sea; Rosneft will develop it jointly with Statoil.

LUKOIL acquired 20% in the license PL708. Sweden’s Lundin Petroleum is the project operator; Italy’s Edison and Norway’s North Energy own 20% each.

In February 2014, the government of Norway began to draft a list of licensed sites to be distributed during the next, 23rd licensing round. Admission of the applications closed on 6 September 2016 for 24 sites on the Norwegian Sea shelf and 32 sites on the Barents Sea shelf. 8 sites are located to the north of the 75° northern latitude (further up north than any of the sites already distributed) and are within the polar ice area.¹³ This decision of the Norwegian government was sharply criticized by political parties and public organizations insisting that licensing out sites in the areas which are permanently or temporarily covered with ice should be suspended, since there are no tested and approved technologies for tackling oil spills in the ice-covered area.¹⁴ Besides, several sites are situated on the border with Russia in the area previously closed for oil and gas industry. Rosneft, LUKOIL,

⁸ Greenland’s Arctic Oil Exploration Unlikely to Bring Results in 5-10 Years // Sputnik News. 24 May 2016. URL: <https://sputniknews.com/world/20160524/1040180017/greenland-oil-exploration.html>

⁹ Snøhvit Gas Field, Norway // Offshore Technology. URL: <http://www.offshore-technology.com/projects/snohvit-field>

¹⁰ Goliat. The Development Concept // Eni Norge. URL: <http://www.eninorge.com/en/Field-development/Goliat/Development-solution>

¹¹ Endless Accidents at Goliat Undermine Norway’s Exploration Plans. URL: <http://teknoblog.ru/2016/09/08/68340> (in Russian)

¹² Eni’s Norway Troubles Risk Fueling Fight Against Arctic Oil // Bloomberg. 8 September 2015.

URL: <https://www.bloomberg.com/news/articles/2016-09-08/eni-s-troubles-off-norway-risk-fueling-fight-against-arctic-oil>

¹³ Nomination of Blocks for the 23rd Licensing Round // Norwegian Petroleum Directorate. URL: <http://www.npd.no/en/Topics/Production-licences/Theme-articles/Licensing-rounds/23rd-Licensing-round/Nomination-of-blocks-for-the-23rd-licensing-round>

¹⁴ Norway Offers Northernmost Oil Blocks Amid Polar Ice Cap Row // Bloomberg. 20 January 2015.

URL: <http://www.bloomberg.com/news/articles/2015-01-20/norway-offers-northernmost-blocks-for-oil-and-gas-exploration>

and Dea Norge AS owned by the Russian entrepreneur Mikhail Fridman, are among those who applied for the licenses.¹⁵ The winners will be announced in the first quarter of 2017.

Canada

The first offshore well on the Canadian continental shelf was drilled in the Beaufort Sea by Imperial Oil in 1973. A total of 141 wells were drilled between 1973 and 1989. This was followed by a lengthy break before the most recent well – the 142nd – was drilled in 2005 by US company Devon.¹⁶

The Government of Canada boosted the development of oil and gas activities on its continental shelf by offering subsidies and grants to companies willing to explore the area. But these subsidies were discontinued in the mid-1980s which, along with declining oil prices at the time, led to drilling work on the Beaufort Sea to come to a complete halt by 1989.

Despite extensive exploration work, large deposits of oil and gas were never uncovered in the Canadian part of the Beaufort Sea.

In 1997, the Government of Canada started issuing licences for carrying out geological exploration in the Beaufort Sea. In the following years, licenses were issued to such companies as Encana (Canada), Burlington Resources (United States, purchased by ConocoPhillips in 2006), Shell, BP (United Kingdom), Petro-Canada (Canada), Anadarko (United States), MGM Energy (Canada), Chevron (United States), Imperial Oil, ConocoPhillips (United States), Devon and Franklin Petroleum (United Kingdom).¹⁷

Exploratory drilling carried out by Devon at the Gulf of Beluga during the winter and spring of 2005-2006 revealed recoverable hydrocarbon deposits, although not enough to start commercial development of the area.

A report published by the National Energy Board of Canada¹⁸ in November 2014 pointed out that,

at present, only one hydrocarbon deposit had been discovered on the islands of the Canadian Arctic Archipelago. The Hecla deposit is thought to have reserves in the amount of 75 billion cubic metres of gas and 31 million barrels of oil. Meanwhile, only 178 billion cubic metres of gas and 667 million barrels of oil have been explored in the Beaufort Sea.¹⁹

Imperial Oil, BP and Exxon Mobile have set up joint venture to carry out exploratory works. The companies are not expected to start drilling until 2020. Chevron and Statoil were also planning to start joint drilling in 2020. But in December 2014, Chevron announced that it would be suspending preparatory work indefinitely due to falling oil prices on the global markets and the resultant desire to reduce the company's operating expenses.

In June 2016, Shell announced it had returned its licenses for the sites in the Canadian waters of the Beaufort Sea due to a long-standing confrontation with the local communities and the Government of Canada, which both insist that the licensed sites be recognized as natural maritime reserves.²⁰ At the same time, some experts believe that the reason for Shell's decision was its need to minimize spending on Arctic operations due to their unprofitability and the refusal of the Government of Canada to loosen the legal requirements for drilling in the Arctic while the companies had been unable to comply with them.

United States

At present, only oil is being produced on the US continental shelf. And all the sites where it is being produced are located in the Beaufort Sea.

Extraction operations are carried out either from the mainland with the help of horizontal drills, or from artificial islands that have been erected at shallow depths (up to ten metres). There are currently no offshore platforms in operation on the Beaufort Sea.

¹⁵ LUKOIL, Rosneft and Dea Are Willing to Receive Licensing Sites in Norway // Vedomosti. 6 December 2015. URL: <https://www.vedomosti.ru/business/articles/2015/12/07/619856-lukoil-rosneft-dea> (in Russian).

¹⁶ Nattel M. Oil, Gas and Rights of Indigenous Peoples in the Arctic: Example of North Canada // Ethnographic Review. 3, 2008 (in Russian).

¹⁷ History of the Canadian Oil Industry (Key Dates) // GeoHelp. URL: <http://www.geohelp.net/history.html>

¹⁸ Assessment of Discovered Conventional Petroleum Resources in the Northwest Territories and Beaufort Sea // National Energy Board of Canada. November 2014. URL: <https://www.neb-one.gc.ca/nrth/pblctn/2014ptrlmsrc/2014ptrlmsrc-eng.pdf>

¹⁹ Reference Information: oil production in Canada reached 193 million tonnes (1.6 billion barrels), gas production – 154 billion cubic metres.

²⁰ Shell Surrenders Canada Arctic Rights to Marine Park Plan. URL: <http://phys.org/news/2016-06-shell-surrenders-canada-arctic-rights.html>.

Current production levels in the Beaufort Sea remain rather low. For example, the Endicott Oil Pool yields around 5,000 barrels of oil per day; the Point McIntyre Oilfield 18,000 barrels per day; and the Nikaitchuq Oilfield 25,000 barrels per day.

All offshore oil projects in the Beaufort Sea are located within 10 miles of the coast. All offshore oil projects are connected to the Trans-Alaska Pipeline System,²¹ which delivers oil to the oil terminal in the port of Valdez in southern Alaska.

At present, Shell leases the majority of sites in the Beaufort and Chukchi seas. But other companies also lease sites in the region, including Statoil (Norway), BP (United Kingdom), ConocoPhillips (US), Eni (Italy), Murphy (United States), Iona Energy (Canada), OOGC America (a subsidiary of China National Petroleum Corporation) and Repsol (Spain).

Shell carried out exploratory operations in the Beaufort Sea and Chukchi Sea as early as the 1970s and 1980s, which resulted in the discovery of a number of oil and gas deposits; developing them, however, would have been unprofitable at the time.²² The company returned to the Arctic in 2005, leasing a site in the Beaufort Sea. In 2008, it leased another site in the Chukchi Sea. The areas under development are located between 60 and 100 miles from shore.²³ Despite Shell's considerable efforts, significant reserves of oil have yet to be discovered.

It should be noted that, since 2007, Shell's Arctic programme has been complicated by opposition from environmental organizations in the United States, triggering a series of lawsuits against the company itself and against the Government, as well as by stricter security requirements, which were implemented following the explosion and

oil spill on the Deepwater Horizon platform in the Gulf of Mexico in 2010.²⁴

Since 2005, Shell drilled only two exploration wells in 2012 in the Beaufort Sea and in the Chukchi Sea. The drilling was accompanied by a series of accidents on the Noble Discoverer²⁵ drilling vessel and the Kulluk oil rig.²⁶ Shell also drilled one well in 2015 in the Chukchi Sea.

Pursuant to the results of the drilling, the company announced it had discovered signs of oil and gas deposits, but their amount was insufficient for commercial development. Consequently, in September 2015, Shell announced it pulled the plug on its oil and gas development program on the Alaska shelf, even though it had spent \$7 billion on the program.²⁷

In November 2015, Statoil announced it would not further develop production on the Alaska shelf. In 2016, ConocoPhillips, Eni, and Iona Energy also abandoned their Alaska shelf projects.²⁸

The companies' decision to abandon their Alaska projects stems from a range of factors. First, the results of Shell's work: having poured significant investments into the project, it failed to discover commercial hydrocarbon deposits. Second, dropping oil prices and the need for oil and gas companies to optimize their expenses. Third, uncertainty stemming from the US Government's intentions to tighten Arctic shelf drilling regulations.

The termination of Arctic shelf exploration did not exactly come as a surprise for the US Government. Back in 2014, the US Energy Information Administration in its Annual Energy Outlook by 2040, projected a decline in oil production in Alaska, including the offshore deposits, with gas production showing insignificant growth.²⁹

²¹ The throughput capacity of the oil pipeline is 2.1 million barrels per day. In 2013, the ongoing decline in oil production in Alaska meant that only 0.53 million barrels were produced per day.

²² Shell – A Long Alaska History // Shell. URL: <http://www.shell.us/content/dam/shell/static/usa/downloads/alaska/alaska-022510.pdf>

²³ Shell Alaska Readies Ice-Class Drilling Units For Beaufort Sea // Oil&Gas Journal. 10 January 2007. URL: <http://www.ogj.com/articles/print/volume-105/issue-37/drilling-production/shell-alaska-readies-ice-class-drilling-units-for-beaufort-sea.html>

²⁴ Shell's Lawsuit against Environmental Groups Declared Unconstitutional by Appeals Court // OCEANA. 2 December 2014. URL: <http://oceana.org/blog/2014/12/shell-s-lawsuit-against-environmental-groups-declared-unconstitutional-by-appeals-court>

²⁵ The Noble Discoverer was built in 1966 and was intended to transport timber. It was later turned into a drillship.

²⁶ The Kulluk ice-resistant stationary platform was built in 1983 by the Japanese company Mitsui Engineering & Shipbuilding. Until 1993, it was operated by the Canadian company Gulf Canada Resources in the country's Arctic waters, before being decommissioned. Shell purchased the platform in 2005. The rig was hauled to China to be recycled following an accident in December 2012.

²⁷ Shell Abandons Contentious Arctic Exploration after Poor Results // Financial Times. 28 September 2015. URL: <https://www.ft.com/content/19de519e-65a8-11e5-a28b-50226830d644>

²⁸ Shell, ConocoPhillips Drop Arctic Drilling Plans // US News. 10 May 2016. URL: <http://www.usnews.com/news/articles/2016-05-10/shell-conocophillips-drop-arctic-drilling-plans>

²⁹ Annual Energy Outlook 2014 with Projections to 2040 // US Energy Information Administration. April 2014. URL: [http://www.eia.gov/forecasts/aeo/pdf/0383\(2014\).pdf](http://www.eia.gov/forecasts/aeo/pdf/0383(2014).pdf)

Russia

The Soviet Union started actively developing its Arctic shelf in the early 1980s. The most promising areas of the Arctic shelf were in the Pechora and Kara seas, which are aquatic extensions of the Timan-Pechora and Western Siberian oil and gas provinces.³⁰

Determined to develop oil fields at home and abroad, the Soviet Union commissioned a number of drilling vessels. Investments in the creation of a drilling fleet from 1983 to 1992 in the Barents, Pechora and Kara seas led to the discovery of 10 large deposits.

In the period following the collapse of the Soviet Union, from 1991 to 1998, Russia's drilling fleet operated almost exclusively on the shelf of Western Europe, Asia, Africa and South America.

The termination of geological exploration work in the Arctic after 1991, coupled with the loss of the Arctic drilling fleet, mean that the Russian Arctic shelf remains largely unexplored: only 20 per cent of the Barents Sea and 15 per cent of the Kara Sea have been explored, while the East Siberian, Laptev and Chukchi seas have not been explored at all.

A total of 25 deposits have been discovered on the Russian continental shelf, all of which are located in the Barents and Kara seas (including the Gulf of Ob and the Taz Estuary). Recoverable commercial reserves in the deposits amount to over 430 million tonnes of oil and 8.5 trillion cubic metres of natural gas.

As a result of amendments made in 2008 to Federal Law "On Mineral Wealth" dated 21 February 1992, which limited the range of companies that can be issued licenses to carry out subsoil work on the continental shelf of the Russian Federation, only Rosneft and Gazprom are currently allowed to develop the area.

The first and thus far only oil and gas project to be carried out on the Russian Arctic shelf is the

development of the Prirazlomnoye field, which was discovered in the Pechora Sea in 1989. The field has estimated reserves of 72 million tonnes of oil. Gazprom Neft Shelf holds the license for its development. In August 2011, the Prirazlomnaya offshore ice-resistant stationary platform was delivered to the oil field. It has a design capacity of 6.5 million tonnes per year. Industrial development of the field commenced in December 2013. In 2014, the platform delivered 300,000 tonnes of oil (around 2.2 million barrels) to the Port of Rotterdam. The oil produced at the deposit is called Arctic Oil (ARCO). The area where the oil field is located is noted for its complex natural and climatic conditions – ice persists for seven months of the year, ice hummocks can be up to two metres in height, and the air temperature can drop to below –45°C.³¹ Oil is taken off the rig by Mikhail Ulyanov and Kirill Lavrov, two oil tankers of enhanced Arctic 6 Ice Class (Arc6), owned by Sovkomflot.

In 2016, the company plans to produce 2.1 million tonnes of oil. The project has not yet thus far reached its design capacity. Nine oil-producing wells are slated to be constructed and made operational in 2016–2017; they will produce over 5 million tonnes of oil.

The Gazprom Group continues its preparations to implement two projects in the Pechora Sea: the Dolginskoye Oil Field and the North-Western licensed site.

Four exploratory wells have already been drilled at the Dolginskoye oil field. Recoverable reserves are estimated to be more than 200 million tonnes of oil equivalent (1.7 billion barrels)³². Gazprom wants to attract Vietnamese company PetroVietnam to the project.³³ Production is expected to start in 2020, with peak levels of 4.8 million tonnes of oil per year to be achieved by 2026.

Gazprom proposed China National Offshore Oil Corporation participation in developing the North-Western licensed site (estimated deposits of 105 million tonnes of oil and condensate, and 60 billion cubic meters of gas).³⁴ All in all, in accordance with its licensing

³⁰ Novikov Y.N. Several Problems of Researching and Exploring Hydrocarbons' Potential of Russia's Maritime Space // Oil and Gas Geology. Theory and Practice. 2012. V.7. № 4. P. 7. URL: http://www.ngtp.ru/rub/5/68_2012.pdf (in Russian).

³¹ Savina A. Times of Arctic. Project for Development of Prirazlomnoye Field // Gazprom Neft. URL: <http://www.gazprom-neft.ru/press-center/sibneft-online/archive/2016-may/1113344>

³² Gazprom Started Exploration Drilling on Dolginskoye Oil Field on the Arctic Shelf // Gazprom. 30 June 2014. URL: <http://www.gazprom-neft.ru/press-center/news/1102430/> (in Russian).

³³ Gazprom and PetroVietnam Created a Joint Venture to Explore Dolginskoye Oil Field // Vedomosti. 25 November 2015. URL: <http://www.vedomosti.ru/companies/news/36446101/gazprom-neft-i-petrovietnam-sozdali-sp-dlya-razrabotki>

³⁴ Gazprom Offered CNOOC Projects on Russian Shelf // Vesti Economy. 6 September 2016. URL: <http://www.vestifinance.ru/articles/74680> (in Russian).

obligations, the Gazprom Group is mandated to drill at least nine wells in the Arctic shelf prior to 2030.

As relevant as ever is the Shtokman field, which was discovered in 1988 and is located in the central part of the Barents Sea, 550 kilometres northwest of Murmansk. The sea depth around the oil field is between 320 and 340 metres.³⁵ It boasts reserves of 3.9 trillion cubic metres of gas and 56.1 million tonnes of gas condensate.

In total, Gazprom owns seven licensed areas in the Barents Sea, three in the Pechora Sea, thirteen in the Kara Sea, eight in the Gulf of Ob and one in the East Siberian Sea.

The other Russian company, Rosneft, owns six licensed areas in the Barents Sea, eight in the Pechora Sea, four in the Kara Sea, four in the Laptev Sea, one in the East Siberian Sea and three in the Chukchi Sea. In order to fulfil its existing license obligations, Rosneft signed strategic cooperation agreements in 2011 and 2012 with Exxon Mobil, Statoil and Eni that envisage, among other things, joint geological exploration and development of hydrocarbon deposits in the Arctic shelf.

In August 2014, exploratory drilling work carried out by the Rosneft–Exxon Mobile joint venture Karmorneftegaz in the East-Prinovozemelsky-1 licensed area in the Kara Sea resulted in the discovery of an oil field “Pobeda” with recoverable reserves of 130 million tonnes of oil and 500 billion cubic metres of natural gas.³⁶ It should be noted that the region where the drilling is taking place is marked by extremely difficult climatic conditions: 1.2–1.6 metres of ice cover the sea for 270–300 days of the year, and temperatures routinely drop to as low as –46 °C in winter.

In order to fulfil its existing license obligations, in 2014 Rosneft signed a long-term agreement with the Norwegian company North Atlantic Drilling for the use of six offshore drilling rigs in its shelf projects, including its Arctic shelf projects, until 2022.³⁷ To increase access to its drilling fleet, in 2014 Rosneft also signed a framework agreement with Seadrill Limited and North Atlantic Drilling Limited on the exchange of assets and investments.

The political tensions brought about by Russia’s position on the Ukrainian crisis led to a number of governments, including those of the United States, the European Union and Norway, imposing sanctions against Russia in various sectors of the economy during the second half of 2014. These included embargoes on the supply of equipment and technology, as well as bans on companies providing services for projects to develop offshore oil resources in the Arctic implemented by Rosneft and Gazprom (including Gazprom Neft). In addition, restrictions were placed on the ability of Russian oil companies and banks to attract financing from abroad.

These sanctions have already led to a number of foreign oil companies, including Exxon Mobil, suspending their participation in Russian Arctic shelf projects.

Russian oil and gas sector is highly dependent on equipment and services from states that imposed these sanctions.

The level of dependence on “Western” equipment and services to carry out projects on the Arctic shelf – offshore drilling rigs, pump and compressor equipment, downhole equipment, electric power generation equipment and computer software – is particularly high. At the same time, import replacement is only possible in the long term, that is, by 2020–2025 at the earliest. Using equipment and services from third-party countries, primarily China, carries greater risks of accidents because the quality is noticeably poorer.

As a consequence, there is a risk that Rosneft and Gazprom could default on their license obligations. Consequently, Rosneft and Gazprom applied to the Federal Subsoil Resource Management Agency with a request to extend their licensing obligations. 19 Rosneft sites in the Arctic and 12 Gazprom sites had their schedules and volumes of seismic exploration adjusted by 2–5 years on average, and their drilling schedules adjusted by 3 years on average. These adjustments applied, in particular, to two sites of the Shtokman field, which Gazprom should make operational no earlier than 2025 instead of 2016 as had been planned, and to the Dolginskoye Field which is now to be made operational in

³⁵ Shtokman Project // Gazprom. URL: <http://www.gazprom.ru/about/production/projects/deposits/shp/> (in Russian).

³⁶ Rosneft. URL: <http://www.rosneft.ru/exxonmobil/09082014.html> (in Russian)

³⁷ Rosneft. URL: <http://www.rosneft.ru/news/pressrelease/21082014.html> (in Russian).

2031 instead of 2019. The largest number of sites (nine) with adjusted schedule is in the Pechora Sea, eight are in the Barents Sea, four are in the Kara Sea, and one is in the East Siberian Sea³⁸.

Due to the exploration schedule adjustment, the production on the Arctic shelf will yield only 13 million tonnes by 2030 instead of the previously planned 18 million tonnes.

Rosneft, jointly with Rosneftegaz and Gazprom-bank are constructing the Zvezda shipbuilding complex at the Far Eastern Shipbuilding and Ship Repair Center. Against the background of the imposed sanctions, all Rosneft's contracts to build new maritime facilities and vessels, as well as to design and build two multifunctional enhanced ice-class support vessels will go to the Zvezda complex.³⁹

On the whole, despite the existing problems, developing Arctic oil and gas deposits remains a strategic priority for Russia, given that the shelf deposits are estimated to have 106 billion tonnes of oil equivalent, including 70 trillion cubic meters of gas reserves.

At the same time, implementing the plans for the Arctic shelf development (bringing Arctic shelf production to 35 million tonnes of oil and to 10% of all Russian-produced natural gas by 2035) might require investments of over \$1 trillion⁴⁰ and is largely hindered by the financial sanctions.

Conclusion

The continental shelf plays an important role in sustaining global oil and gas production. Over the past ten years, more than two-thirds of the world's hydrocarbon reserves have been discovered on the continental shelf. All the Arctic states have passed legislation stating the strategic importance of the area, primarily in terms of hydrocarbon reserves.⁴¹

That being said, the Arctic states have barely even begun to explore and develop these resources. At present, few projects are being car-

ried out on the continental shelf of the United States, Norway and Russia. Experts predict that, by 2030, geological exploration will primarily be conducted in the Arctic shelf, and deposits in the area will be prepared for further, large-scale development.

The ability of the Arctic states and oil companies to develop the Arctic's offshore oil resources will depend on the following factors:

1. TECHNOLOGICAL DEVELOPMENT

The oil and gas projects that are currently being implemented on the Arctic shelf differ greatly in terms of the technology they use. This is due to the fact that climate conditions vary in these areas. As a result, new technologies must be developed and technological solutions found for practically every single project. This increases project timeframes and costs.

2. INFRASTRUCTURE DEVELOPMENT

At present, the number of on-land infrastructure facilities (repair stations, supply depots and rescue centres) for carrying out offshore oil and gas operations is extremely limited.

What is more, the capacity and configuration of existing pipeline systems and ports (terminals) in the region limit the ability to deliver higher volumes of hydrocarbon to consumers outside the Arctic.

3. CLIMATIC AND NATURAL CONDITIONS

Low temperatures, pack ice and icebergs are distinctive features of the climatic and natural conditions in the region. They significantly reduce the available time to perform drilling and other offshore operations, and additional requirements in terms of equipment and personnel thus need to be put in place.

4. ENVIRONMENTAL SAFETY

It is clear that any anthropogenic activity in the Arctic should have a minimal effect on the Arctic ecosystem, causing as little harm as possible. Sections of the Arctic Ocean are officially protected, and any kind of mining activity is prohibited there.

³⁸ The Arctic without Wells // RBC. 9 June 2016. URL: <http://www.rbc.ru/newspaper/2016/06/10/57593ed59a79476c142e7256> (in Russian).

³⁹ Rosneft. 17 August 2016. URL: <https://www.rosneft.ru/press/news/item/183325/> (in Russian).

⁴⁰ Ministry of Energy of Russia will Need Around 1 trillion USD of Investment in Infrastructural Energy Projects Until 2020 // Pro Arctic. 21 June 2016. URL: <http://pro-arctic.ru/21/06/2012/news/377> (in Russian).

⁴¹ Russia adopted the State Policy of the Russian Federation in the Arctic for the Period until 2020 and a Further Perspective on 18 September 2008; the United States passed the National Strategy for the Arctic Region on 10 May 2013; Canada put through Canada's Northern Strategy: Our North, Our Heritage, Our Future in 2009; Norway passed the Government's High North Strategy in 2006 and published the report "A Strategic Vision for the North" in 2011; and Denmark adopted the Kingdom of Denmark's Strategy for the Arctic 2011–2020 in 2011.

The increased activity of environmental organizations that oppose resource development activities in the Arctic could significantly complicate the plans of oil and gas companies and Arctic states to carry out their respective projects.

It is also necessary to take into account the risks associated with the consequences of possible offshore oil spills, which could not only lead to the company responsible for the spillage going bankrupt, but also to all offshore development activities being halted as a response to pressure from environmental organizations.

5. FINANCIAL AND ECONOMIC CONDITIONS

According to a number of experts, Arctic offshore oil projects are only profitable if the price of oil is between \$40 and \$90 per barrel, depending on the region. As such, the decline in world oil prices that began in 2014 forced many oil and gas companies to announce that they were suspending their operations in the Arctic because they were not profitable. At the same time, several other oil and gas companies that have already invested significant resources in Arctic projects have continued their work in the region. They are waiting for a favourable change in prices once commercial operations start.

Tougher national and international regulations on industrial and environmental safety may exert an additional financial burden on Arctic projects, particularly the requirements that state that companies should have the necessary equipment to drill relief wells quickly in the event of a spill.

6. SANCTIONS

Sanctions have been imposed against Russia by a number of Western countries, including all the Arctic states, with regard to supplying technologies and services to the Arctic shelf. This seriously hamstrings Russia's ability to carry out projects in the region. At the same time, it should be noted that restricting access to proven technologies and solutions increases the risk of accidents.

It is clear that each of the factors described above carries its own risks of uncertainty. For example, it is difficult to predict what oil prices will be in the long term, what breakthroughs will be made in offshore drilling technology in the Arctic, and whether the polar ice caps will increase in volume by 2040, as some scientists have predicted.

RECOMMENDATIONS

1. It is necessary to start developing economically sound technologies and technical solutions capable of ensuring safe and efficient oil and gas production, and to start building the appropriate infrastructure, given that 5–10 or more years may elapse between making the decision to start geological exploration and starting commercial oil production in the Arctic. Given the scale of the task at hand, it is expedient to use private-public partnership mechanisms in this area.
2. Arctic states should start developing unified rules and standards. It will allow oil and gas companies to develop and use unified technical solutions in all the states of the region without spending time and money on adapting to the requirements and rules of each individual country. Some work in this area is currently being done, but it is largely fragmented and non-systemic.
3. Enhancing cooperation between Arctic states and oil and gas companies concerned becomes more and more relevant in the area of creating common approaches to developing new technologies, unified standards and rules. It would be expedient to continue using the Arctic Council, a greatly respected high-level intergovernmental forum, as a venue for carrying out this work.
4. Enhancing international Arctic cooperation allowed to ensure top security and low level of confrontation in the region. Arctic states need to further avoid politicizing Arctic cooperation against the general geopolitical background. Otherwise, it will have a significant impact on the prospects of conducting coordinated policies and implementing joint projects. Transferring international tensions into the Arctic against the background of sanctions may prompt Russia to consider involving non-regional actors, primarily Asian states, in the Arctic cooperation. Under such circumstances, international cooperation in the Arctic may undergo serious changes, and the volume of contracts for Western-made shelf development equipment may decline significantly.



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